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A NEW SPECIES OF CARDINALFISH (APOGONIDAE) FROM NORTHERN AUSTRALIA AND THE ARU ISLANDS

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ABSTRACT

A new species of cardinalfish (Apogonidae) is described from 23 specimens collected off the Northern Territory coast, York Sound,Western Australia, and at the Aru Islands, Indonesia. It is similar in general appearance, particularly colour pattern, to the two apogonids of the genus *Sphaeramia* Fowler and Bean, *S. nematoptera* (Bleeker) and *S. orbicularis* Kuhl and Van Hassett. However, it differs from them in a number of morphological features including counts for fin rays and gill rakers. It also differs from these species and all other apogonids in possessing an unusual spindle-shaped egg.

KEYWORDS: taxonomy, cardinalfish, Apogonidae, new species, northern Australia, Aru Islands.

INTRODUCTION

The cardinalfish family Apogonidae is comprised of approximately 200 species and 25 genera (Fraser 1972). Most species dwell on Indo-Pacific coral reefs, although the group is also represented in the Atlantic and seven species occur in cool seas of southern Australia. Another seven species belonging to the genus *Glossamia* Gill are restricted to fresh water in the northern Australia-New Guinea region.

The family is well represented in Australia, although published documentation is inadequate. The only previous Australian reviews are those of McCulloch (1929) and Munro (1960), who recorded 45 and 49 species respectively. In addition, Whitley (1964) included 57 species in his non-annotated checklist. A number of new records have been added in the past decade as a result of extensive collections by the author and various colleagues. A total of 90 species are included in the annotated checklist of Australian fishes currently in preparation by Allen, Hoese and Paxton. While studying museum collections of Apogonidae in connection with the checklist several specimens of an undescribed *Apogon* Lacépède trawled off northern Australia were located at the Australian Museum, Northern Territory Museum, and the Western Australian Museum. Apart from morphological characters the new species differs from all other apogonids with regards to its unusual spindle-shaped egg.

Type specimens are deposited at the Australian Museum, Sydney (AM), Northern Territory Museum, Darwin (NTM), and Western Australian Museum, Perth (WAM). The range of counts and measurements for paratypes, if different from the holotype, are indicated in parentheses in the following description.

SYSTEMATICS

Apogon fusovatus sp. nov.
(Fig. 1)

Type material. HOLOTYPE - WAM P14397, female, 94.0 mm SL, vicinity of Darwin Northern Territory, Australia, 4 September 1965, collector unknown. PARATYPES - NORTHERN TERRITORY: AM I.21957-019, 4 specimens, 70.4-75.4 mm SL, south of Raragala Island, Wessel Islands, Arafura Sea (approximately 11°47′S 136°16′E), bottom trawl aboard R.V. Soela, 0-28 metres, J. Paxton and D. Bray, 22 November 1980; NTM S.10049-006, 7 specimens, 30.6-64.5 mm SL, off Lee Point (approximately 12°20′S 130°54′E), N.T. Fisheries Department, June 1975; NTM S.10120-007, 2 specimens, 77.1 & 87.7 mm SL, north of Mickett Creek, Shoal Bay (approximately 12°16′S 131°01′E), N.T. Fish-

eries Department, 25 August 1977; NTM S.10122-010, 93.8 mm SL, Shoal Bay, N.T. Fisheries Department, 20 October 1977; NTM S.10250-002, 2 specimens, 55.0 & 60.4 mm SL, off Murgenella Creek, Van Diemen Gulf (approximately 11°51′S 132°48′E), N.T. Fisheries Department, 17 January 1978, NTM S.10362-002, 25.2 mm SL, Shoal Bay, N.T. Fisheries Department, 28 May 1975; WAM P28316-001, 66.0 mm SL, approximately 85 km southwest of Darwin, 46-50 metres, E. Barker, 10 September 1965; WAM P14516-17, 2 specimens, 83.5 & 88.0 mm SL, 37 km north of Darwin, E. Barker 9 September 1965. WESTERN AUSTRALIA: NTM S.966, 89.0 mm SL, York Sound (approximately 14°53′S 125°03′E), 30 metres, J. Menzies, July 1975. INDONESIA. ARU ISLANDS: WAM P28315-001, 83.0 mm SL, otter trawl, 2-6 metres, T. White, June 1971.

Fig. 1. *Apogon fusovatus*, holotype, 94 mm SL, WAM P.14397, from Darwin, N.T.

Diagnosis. A species of *Apogon* (subgenus *Nectamia* Jordan as defined by Fraser 1972) with the following combination of characters: Dorsal rays VII-I,9; anal rays II,9; lateral line complete with 25 tubed scales; total gill rakers on first arch 18 to 20; no canine teeth; preopercle ridge mainly smooth except weakly serrate at lower angle; scales ctenoid; colour pale with faint bar below first dorsal fin and scattered round spots posteriorly, fins mainly dark; ova spindle-shaped instead of round or ovate.

Description. Dorsal rays VII-I,9; anal rays II,9; pectoral rays 16 (includes uppermost rudimentary ray); tubed lateral-line scales 25 and 3 or 4 tubed scales extending onto caudal fin base; horizontal scale rows between lateral line and base of dorsal fin 1, from lateral line to anus 6, on side of caudal peduncle 5; gill rakers on first arch 6 + 14 (5 or 6 + 12 to 14 in paratypes); rakers on posterior surface of first gill arch 2 + 12 (2 + 11 to 13 in paratypes); branchiostegal rays 6.

Greatest body depth 2.6 (2.5 to 2.8), head length 2.2 (2.2 to 2.5), both in standard length (also see Table 1). Greatest width of body 2.3 (1.9 to 2.4) in depth. Snout length 4.4 (3.5 to 4.8), eye diameter 3.6 (3.1 to 3.9), interorbital width 3.8 (3.5 to 4.5); maxilla length 2.0 (1.9 to 2.0), least depth of caudal peduncle 3.3 (2.9 to 3.4); length of caudal peduncle 1.7 (1.5 to 1.8), all in head length.

Scales finely ctenoid, covering most of head and body except naked areas which include most of forehead, snout, preor-

Table 1. Proportional measurements of selected type specimens of *Apogon fusovatus* (expressed as percentage of the standard length)

Character	*Holotype* *WAM P14397*	*WAM P14516-17*		*Paratypes* *AMS I.21957-019*		
Standard length (mm)	94.0	87.5	83.4	75.4	72.5	69.5
Greatest body depth	37.8	38.3	36.1	35.7	35.2	35.6
Body width	16.2	16.1	16.0	15.0	15.5	15.9
Head length	44.7	41.0	43.4	44.6	41.4	42.8
Snout length	10.1	9.5	10.0	9.5	8.7	9.4
Eye diameter	12.1	11.0	11.8	12.5	13.1	13.4
Interorbital width	11.5	10.8	11.2	12.1	11.7	11.9
Maxilla length	22.0	21.8	22.4	22.8	21.4	21.6
Caudal peduncle depth	13.5	14.3	13.0	13.7	13.8	14.1
Caudal peduncle length	26.4	27.9	27.5	27.3	26.5	26.7
Snout to dorsal fin origin	42.0	43.2	42.4	41.8	40.4	42.2
Snout to anal fin origin	66.7	64.7	67.5	64.4	65.1	67.5
Snout to pelvic fin origin	44.9	38.2	44.4	41.2	39.2	42.0
First dorsal spine length	1.8	2.1	2.2	2.5	2.2	2.3
Third dorsal spine length	17.1	18.1	17.0	17.5	16.1	16.8
Tallest soft dorsal ray length	31.3	24.5*	32.2	31.8	31.7	32.1
First anal spine length	2.2	2.3	2.4	2.6	2.8	2.3
Second anal spine length	12.0	12.2	12.4	11.9	12.1	11.6
Tallest soft anal ray length	25.0	24.8	23.1	26.6	25.9	26.4
Pectoral fin length	22.1	22.7	21.2	23.5	21.1	22.3
Pelvic spine length	13.3	13.4	13.8	13.8	13.9	13.4
Pelvic fin length	27.3	26.5	26.0	27.8	28.8	28.4
Caudal fin length	32.0	21.6*	34.6	34.5	30.5	33.4

*denotes damaged condition

bital, lips, jaws, isthmus and portion of preopercle between the rear margin and preopercle ridge; scales covering about basal third of caudal fin; no scales on other fins; preopercle covered with several enlarged, partially embedded scales. A pair of enlarged nasal openings in front of eye on each side of snout, the anterior nostril with membranous rim, tallest around posterior edge; forehead, interorbital, snout, dentary, and preopercle covered with hundreds of tiny sensory pores.

Maxilla extending to level of rear part of pupil; upper and lower jaws with dense band of small conical teeth, canine teeth absent; vomer with narrow crescentic band of similar teeth; palatines edentulous; gill rakers relatively tall and slender, their length about equal to pupil diameter.

Suborbital and posterior circumorbitals with several weak, irregularly spaced serrae; preopercle ridge mainly smooth except a few weak serrae at lower angle; rear edge of preopercle finely serrate, mainly on lower portion around angle, which is rounded; margins of subopercle, interopercle, and opercle entire.

First dorsal spine minute, about one-fourth length of second spine, which in turn is about one-fourth of third or tallest spine. Spine of second dorsal fin less than one-half length of tallest (first) soft dorsal ray. First anal spine minute, about one-fifth length of second spine. First dorsal spine 24.5 (17.7 to 34.2), third dorsal spine 2.6 (2.3 to 2.8), first soft dorsal ray 1.4 (1.3 to 1.7), first anal spine 19.8 (14.6 to 28.5), second anal spine 3.7 (3.1 to 4.0), longest soft anal ray 1.8 (1.6 to 2.1), pectoral fin 2.0 (1.5 to 2.0), pelvic fin 1.6 (1.5 to 1.8), pelvic spine 3.3 (2.7 to 3.3), and caudal fin 1.4 (1.2 to 1.5), all in head length. Caudal fin emarginate.

Colour in alcohol. Overall pale tan to reddish-tan, often with silver sheen on opercle; a faint (more vivid in juveniles) diffuse brown bar, 2-3 scales wide, extending across body from first dorsal fin base to abdomen (scarcely visible on

holotype and several paratypes); about half of paratypes with 4-7 large (pupil size) brown spots visible on side of body, mainly along lateral line; fins dusky brown to blackish except pectorals translucent, pelvics darker than other fins; outer lining of digestive tract black. The live colouration is unknown.

Fig. 2. Distribution of *Apogon fusovatus*.

Comparisons. The only apogonid species which are likely to be confused with *A. fusovatus* are *Sphaeramia nematoptera* and *S. orbicularis*. The three species are characterised by a colour pattern which includes a dark bar below the spinous dorsal fin and scattered large spots on the posterior portion of the body. Although superficially resembling *A. fusovatus*, the two species of *Sphaeramia* have six instead of seven spines in the first dorsal fin and 24 to 37 gill rakes on the first arch compared with 18 to 20 in *A. fusovatus*. Also they have normal-shaped round eggs. Allen (1975) provided a detailed review of the two species of *Sphaeramia*.

Distribution (Fig. 2). *A. fusovatus* is presently known only from northern Australia between York Sound, Western Australia and the Wessel Islands, Northern Territory, and the Aru Islands, Indonesia.

Remarks. This species is unique amongst all apogonids which have been investigated to date in having a spindle-shaped egg (Fig. 3) which when ripe is approximately 7.5 mm in length and 2.5 mm wide. When the eggs were first detected in the mouths of the holotype and 83.5 mm paratype (WAM P14516-17) it was thought they represented an ingested food item, perhaps the larval stage of a crustacean of some sort. However, examination of the gonads of two female paratypes (AM I. 21957-019, 69.5 mm SL and WAM P28316-001, 66 mm SL) revealed a number of similar objects, now identified as eggs, in the ovaries. The mouth of the male holotype has the gular region greatly distended and contains a mass of approximately 100 of the unusually-shaped eggs. The middle part of each egg is attached to a fleshy central mass by a short membranous tendril. Eyes of the developing embryos are clearly evident. Oral brooding is characteristic of

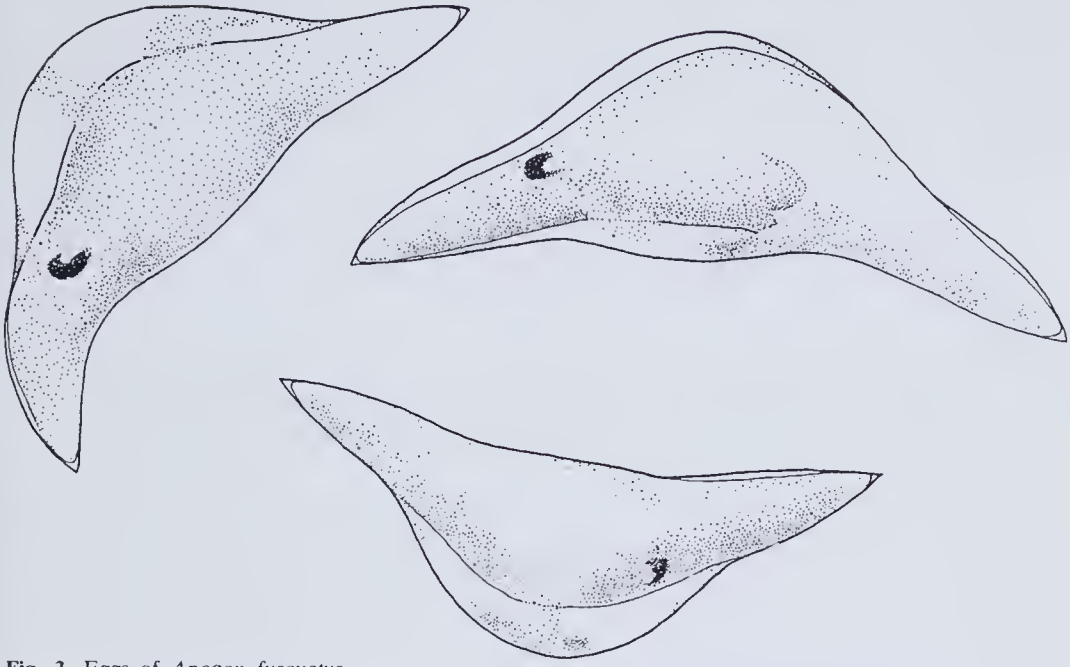

Fig. 3. Eggs of *Apogon fusovatus*.

apogonid fishes and was discussed by Breder and Rosen (1966) and Allen (1975).

The species is named *fusovatus* (Latin for 'spindle-egg') with reference to the unique egg shape.

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REFERENCES

Allen, G.R. 1975 The biology and taxonomy of the cardinalfish, *Sphaeramia orbicularis* (Pisces; Apogonidae). *Journal of the Royal Society of Western Australia* **58** (3): 86-92.

Breder, C. and Rosen, D.E. 1966 *Modes of Reproduction in Fishes*. T.F.H. Publications, Inc: Neptune, New Jersey.

Fraser, T.H. 1972 Comparative osteology of the shallow water cardinalfishes (Perciformes: Apogonidae) with reference to the systematics and evolution of the family. *Ichthyological Bulletin of the J.L.B. Smith Institute of Ichthyology* **34**: 1-105.

MCulloch, A.R. 1929 A check-list of the fishes recorded from Australia. *Australian Museum Memoir* **5**: 1-534.

Munro, I.S.R. 1960 Handbook of Australian fishes. Nos. 34-36, family Apogonidae. *Fisheries Newsletter (Australia)* **19** (10-12): 137-148.

Whitley, G.P. 1964 A survey of Australian ichthyology. *Proceedings of the Linnaean Society of New South Wales* **89**(1): 11-127.

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